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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,620	07/31/2002	Sudipta Mukhopadhyay	RD-29161	8845

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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NISKAYUNA, NY 12309

EXAMINER

HUNG, YUBIN

ART UNIT	PAPER NUMBER
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2624

MAIL DATE	DELIVERY MODE
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06/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/064,620

Applicant(s)

MUKHOPADHYAY ET AL.

Examiner

Yubin Hung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 12-26 and 31-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 12-26, 31-33 and 35-38 is/are rejected.
- 7) ☒ Claim(s) 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/20/06 has been entered.
2. Applicant's arguments filed 12/20/06 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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5. Claim 36 recites the term "comparatively small" in line; it renders the claim indefinite because it is vague and ambiguous and therefore the mete and bound of the claim cannot be ascertained.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, 5, 12-14, 23-26 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy et al. (US 5,297,043) and Nishihara et al. (US 4,903,317).

8. Regarding claim 1, and similarly claims 12, 24 and 31, Tuy discloses

- providing a span of interest for an acquired image sequence, wherein the span of interest defines a time sequence and a space sequence in the acquired image sequence that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence
[Fig. 1, refs. B (acquired image sequence), 20 & 32 (provides a span of interest as recited); Figs. 2 (acquired image sequence), 3A, 3B & 4; Col. 4, lines 66-68; Col. 5, lines 22-24; Col. 6, lines 23-25]
- selecting a portion of the acquired image sequence in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information
[See the analysis above]
- displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without the other information
[Fig. 1, ref. C; Col. 5, lines 22-24]

Tuy does not expressly disclose that the selected portion is losslessly compressed and decompressed.

However, Nishihara discloses losslessly compressing and decompressing region of interest (ROI) of image data. [Figs. 9 (compress) & 10 (decompress); Col. 8, lines 36-45; Col. 9, lines 30-53. Note that the analytically relevant portion of each image in the sequence is an ROI of that image.]

Tuy and Nishihara are combinable because they are from the same field of endeavor of selecting image portion.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Tuy with the teaching of Nishihara by applying lossless compression to the selected portion. The motivation would have been to reduce the storage requirement while preserving the fidelity of the important portion, such as the diseased portion of medical images, as Nishihara indicates in Col. 8, lines 35-43.

Therefore, it would have been obvious to combine Nishihara with Tuy to obtain the invention as specified in claim 1.

9. Regarding claims 2, 3, and similarly claims 25 and 26, Tuy further discloses

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- (claims 2 & 26) wherein the portion of the acquired image sequence is a plurality of frames in a span of interest
[Fig. 3C]
- (claims 3 & 25) wherein the portion of the acquired image sequence is at least one frame in a span of interest
[Fig. 3C]

10. Regarding claim 5, the combined invention of Tuy and Nishihara further discloses

- wherein selecting the portion of the acquired image sequence comprises using a user to select option for selecting the portion of image
[Tuy: Fig. 1, ref. 32]

11. Regarding claim 13, Tuy further discloses

- wherein the imaging device is a medical imaging device selected from a magnetic resonance imaging system, a computed tomography system, an x ray system, an x ray angiogram system and an ultrasound system
[Fig. 1; ref. A and Col. 4, lines 21-27 (CT scanner or MRI)]

12. Claim 14 is similarly analyzed and rejected per the analyses of claims 12 & 13 above.

13. Claim 23 is similarly analyzed and rejected as per the analysis of claim 1 and additionally the fact that lossy compression methods are well-known conventional compression methods and the motivation would have been because they generally have a higher compression ratio than lossless techniques and are preferred when compressed image size is the more important factor. [For example, as admitted in paragraph 0002 of the application.]

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14. Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12-14, 23-26 and 31 above, and further in view of Scorse et al. (US 5,128,776).

15. Regarding claim 4, the combined invention of Tuy and Nishihara discloses all limitations of its parent, claim 1.

Scorse discloses the following limitation that is not expressly disclosed in the combined invention of Tuy and Nishihara:

- archiving the analytically relevant image sequence
[Fig. 1, ref. 34, 38; Col. 4, lines 20-22]

The combined invention of Tuy and Nishihara is combinable with Scorse since they have aspects that are from the same field of endeavor of compression.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Scorse by archiving relevant image sequence. The motivation would have been to have important data preserved for later use or review.

Therefore, it would have been obvious to combine Scorse with Tuy and Nishihara to obtain the invention as specified in claim 4.

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16. Regarding claim 7, the combined invention of Tuy and Nishihara discloses all limitations of its parent, claim 5. In addition, Scorse further discloses

- wherein the user select option comprises manually marking frames of interest
[Fig. 1, ref. 18; Col. 4, lines 35-37]

17. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12-14, 23-26 and 31 above, and further in view of Ransford et al. (EP 479,563 A2).

18. Regarding claim 6, the combined invention of Tuy and Nishihara discloses all limitations of its parent, claim 5.

The combined invention of Tuy and Nishihara does not expressly disclose the following, which is taught by Ransford:

- wherein the user select option comprises segmenting an identifiable anatomy of a patient
[Col. 11, lines 28-32]

The combined invention of Tuy and Nishihara is combinable with Ransford since they have aspects that are from the same field of endeavor of medical image processing (specifically, X-ray and ultrasound images).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Ransford as

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recited above. The motivation would have been to locate the part (e.g., thorax) of a patient that is of interest, as Ransford indicates in Col. 11, lines 29-31.

Therefore, it would have been obvious to combine Ransford with Tuy and Nishihara to obtain the invention as specified in claim 6.

19. Regarding claim 8, Ransford further discloses

- wherein the user select option comprises sketch-gripping an image boundary
[Col. 11, lines 28-32]

20. Claims 15, 16, 32, 33 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12-14, 23-26 and 31 above, and further in view of Sutherland et al. (USPUB 2005/0277823 A1)).

21. Regarding claim 15, and similarly claim 32, per the analysis of claim 1 the combined invention of Tuy and Nishihara disclose

- providing a span of interest for the images obtained by (an imaging device), wherein the span of interest defines a time sequence between two time instances that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence
- selecting a plurality of frames of interest in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information
- applying lossless compression to the plurality of frames of interest and obtaining therefrom a compressed image sequence

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- applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
- displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without displaying the other information

(Note that since each image in the span of interest is 2-dimensional, a the portions of the images corresponding to the span of interest corresponds to a space sequence.)

The combined invention of Tuy and Nishihara does not expressly disclose that the frames are obtained from an x-ray angiogram.

However, Sutherland discloses capturing x-ray angiograms (as image frames) and comparing a series of angiograms over a time period (i.e., between two time instances) for diagnostic purpose [Figs. 6A-6C, 7A, 9A, 9B; Abstract; Paragraphs 3, 12, 41-45, 56, 69, 70].

The combined invention of Tuy and Nishihara is combinable with Sutherland since they have aspects that are from the same field of endeavor of image acquisition.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Sutherland by using x-ray angiograms over a time period (for diagnostic purpose). The motivation would have been to be able to track vascular intervention site, as Sutherland indicates in paragraph 12.

Therefore, it would have been obvious to combine Sutherland with Tuy and Nishihara to obtain the invention as specified in claim 15.

22. Regarding claim 16, and similarly claim 33, Sutherland further teaches/suggests a span for analysis as the span when the dye is present, i.e., begins when the dye appears and ends when it disappears [Paragraph 3, last 3 lines].

23. Regarding claim 35, note that Nishihara further discloses defining space sequence using a binary mask [Fig. 11, ref. a and Col. 9, lines 11-14; note that the coordinates specify a binary mask].

24. Regarding claim 36, the span of time for the images selected per Tuy's disclosure (per the analysis of claim 1) is considered comparatively small.

25. Regarding claim 37, and similarly claim 38, the combined invention of Tuy, Nishihara and Sutherland closes substantially the claimed invention as set forth in the discussion above for claim 16, namely that an unspecified percentage of images are selected and compression is applied that achieves an unspecified compression ratio.

The combined invention of Tuy, Nishihara and Sutherland does not disclose expressly the specific ranges for the selection percentage (claim 37) or compression ratio (claim 38).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply the specific ranges as recited in claims 37 and 38. Applicant has not disclosed that the specific ranges provide an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with either the unspecified ranges taught by the combined invention of Tuy, Nishihara and Sutherland or the specific ranges as claimed because both perform the same function of selecting a portion of interest (or relevance) and applying compression to reduce the size.

Therefore, it would have been obvious to one of ordinary skill in this art to modify the combined invention of Tuy, Nishihara and Sutherland with the ranges as recited in claims 37 and 38 to obtain the inventions as specified in claims 37 and 38, respectively.

26. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12-14, 23-26 and 31 above, and further in view of Chui et al. (US 5,841,473).

27. Per the analysis of claim 15, the combined invention of Tuy and Nishihara discloses all limitations of claim 17 except for the imaging device, which is an MRI for claim 17.

However, Chui discloses compressing MRI image sequences [Col. 6, lines 36-44].

The combined invention of Tuy and Nishihara is combinable with Chui since they have aspects that are from the same field of endeavor of image compression.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Chui by compressing MRI image sequences. The motivation would have been because such images are frequently acquired in medical procedures and the reduction of their size (by compression) can save the storage cost.

Therefore, it would have been obvious to combine Chui with Tuy and Nishihara to obtain the invention as specified in claim 17.

28. Regarding claim 18, note that manually selecting frames is well known and practiced in the art. [For example, per the analysis of claim 7, Scorse discloses manual selection of the frames of interest.]

29. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) and Chui et al. (US 5,841,473) as applied to claims 17 and 18 above, and further in view of Reinsch (US 5,134,661).

Regarding claim 19, the combined invention of Tuy, Nishihara and Chui discloses all limitations of its parent, claim 17.

The combined invention of Tuy, Nishihara and Chui does not expressly disclose that the frames of interest in a space sequence are automatically selected using edge detection.

However, Reinsch suggests using edge detection to select areas of interest. [Abstract: lines 1-9.]

The combined invention of Tuy, Nishihara and Chui is combinable with Reinsch since they have aspects that are from the same field of endeavor of image processing.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy, Nishihara and Chui with the teaching of Reinsch by using edge detection to select areas of interest. The motivation would have been because edge detection produces edge points that can be processed to obtain the contours of regions of interest.

Therefore, it would have been obvious to combine Reinsch with Tuy, Nishihara and Chui to obtain the invention as specified in claim 19.

30. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy et al. (US 5,297,043), Nishihara et al. (US 4,903,317) and Zanelli (US 6,515,657).

31. Regarding claim 20, per the analysis of claim 1 the combined invention of Tuy and Nishihara discloses

- providing a span of interest for the images obtained by (an imaging device), wherein the span of interest defines a time sequence and a space sequence in the acquired image sequence that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence
- selecting at least one frame of interest in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information
- applying lossless compression to the at least one frame of interest and obtaining therefrom a compressed image sequence
- applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
- displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without displaying the other information

The combined invention of Tuy and Nishihara does not expressly disclose that the imaging device is an ultrasound device.

However, Zanelli discloses using an ultrasound device to acquire image data. [Abstract; Fig. 6, ref. 50; Col. 28-30.]

The combined invention of Tuy and Nishihara is combinable with Zanelli because they are from the same field of endeavor of selecting image portion.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Zanelli by using an ultrasound device for image acquisition. The motivation would have been because ultrasound device does not expose patients or medical personnel to radiation, as Zanelli indicates in Col. 2, lines 18-26.

Therefore, it would have been obvious to combine Zanelli with Tuy and Nishihara to obtain the invention as specified in claim 20.

32. Regarding claim 21, Official Notice is taken that ultrasonic images are usually fan-shaped (and therefore the selected image will be fan-shaped). [For example, see Koo et al. (US 5,846,203).]

33. Regarding claim 22, note that manually selecting frames is well known and practiced in the art. [For example, per the analysis of claim 7, Scorse discloses manual selection of the frames of interest.]

Allowable Subject Matter

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Zanelli by using an ultrasound device for image acquisition. The motivation would have been because ultrasound device does not expose patients or medical personnel to radiation, as Zanelli indicates in Col. 2, lines 18-26.

Therefore, it would have been obvious to combine Zanelli with Tuy and Nishihara to obtain the invention as specified in claim 20.

32. Regarding claim 21, Official Notice is taken that ultrasonic images are usually fan-shaped (and therefore the selected image will be fan-shaped). [For example, see Koo et al. (US 5,846,203).]

33. Regarding claim 22, note that manually selecting frames is well known and practiced in the art. [For example, per the analysis of claim 7, Scorse discloses manual selection of the frames of interest.]

Allowable Subject Matter

34. Claim 34 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

35. The following is a statement of reasons for the indication of allowable subject matter:

A. Regarding claim 34, closest art of record, while disclosing the method as recited in its parent claim 32 and further the use of a binary mask for defining the space sequence as recited in claim 35, none, alone or in combination, discloses, suggests or teaches using a collimator ring for this purpose.

Conclusion and Contact Information

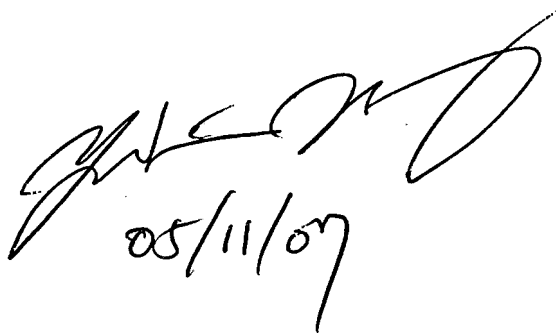
36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Koo et al. (US 5,846,203) – discloses fan-shaped ultrasound images
- Shell et al. (US 5,186,922) – discloses visualizing an arterial circulation using X-ray angiogram with dye

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37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

38. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



05/11/07

Yubin Hung
Patent Examiner
Art Unit 2624
May 11, 2007